Notebook, N-91-10-14

This notebook, which covers the period October 1891-October 1894, is a continuation of N-91-09-03. The book contains notes and drawings by Edison regarding filament deposit experiments, nos. 20-35. There are also notes concerning related experiments, including tests of basic pH solutions for treating filaments. At the end of the book are two loose pages of notes by an unidentified experimenter. The spine is labeled "124." The book contains 197 numbered pages. Two loose pages have been inserted into the book.

Blank pages not filmed: 30-31, 66-67, 118-193.

N-91-10-14

X-E-172

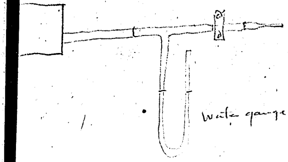
Continued ①

Oct 14 1891.

Experiments on deposited Carbon on Carbon filaments Etc in hot tubes from Carbonaceous Vapors

Experiment No 20

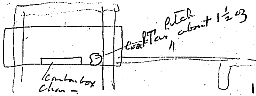
4 oz Buff S = Big retort Carbon box, char -



Lighted retort 325 - Lighted furnace
330 pm —
going to deposit under slight pressure
340 6" pressure — Shut off
retort 4 pm . Very little if any
luminosity to flame during
run fils hairs ng — no deposit
⑩ silvering

⑤

Experiment No 21   Keno 133



10 sil cup more
then 790 hours

started furnace at 455

458 - flame blue - then blue &
luminous tip yellow vapors appear
in glass = fire Exit gives smoky
flame 1½ long at 5 pm
dusty center appears in flame at 5 -
flame very [illegible] -
when I have inch pressure
flame blue inch long
& keep from 5 - till 5-06   inch pressure
then increase to 2" pressure
flame 1¼ long ¼ blue base bal
luminous no yellow

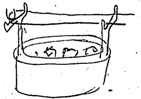
slight horns 510 took pressure off
flame $1\frac{1}{2}$ - smoky horns 3/16 thick
very luminous $\frac{1}{8}$ @ 3/16 mauve base
Central dust stream -
tube yellow - 5 15 I pulsated it
10 times by holding clamp shut
until 3 inches pressure then let go
pulsated it between 5 15 & 520,

Shut off at 5 30 pm —
Carbons shiny no black not heavy deposit

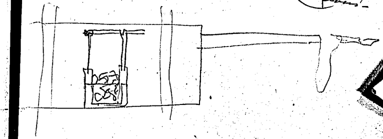
Oct 14/91

Expmt No 22

In Center of Tube round iron box with say 1½ oz Coal tar pitch.



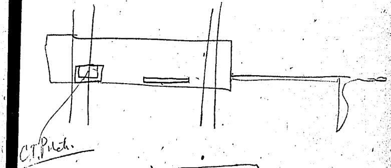
(Carbons smoked up but ~~[illegible]~~ heavy gray deposit in places.)

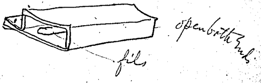


I Light furnace + run to yellow fast as can keeping about 2 inch pressure + spurting it.
Started furnace at 1012 pm
Stopped at 1037 – Tube orange towards last
flame 5/8 – Very luminous
spurted all time –

Expmt 23 —

Oct 15 91

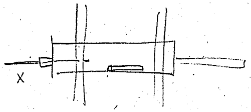



open both ends
fil.

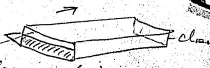
Started fire at 1.16 am Oct 15/91

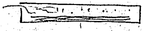
Stopped 145 ~~deposit too~~
Too much tar

Expmt 24 - Keno 132



Put small pieces pitch in at X by rod - Same box as Expmt 23 - Carbons good shiny but thin = while I only put in altogether say equal to hickory nut pieces pbly too big - to prevent sudden rush & extra deposit - I use ~~same~~ pitch at same rate as before but fix by thus





Started 6.05 am 15/9/1
Stopped 7.05

I kept continuously putting in small pieces leisurely — withdrew rod slowly so as not to puff flame at Exit or disturb inside gas by sudden movements = at one time for 5 — minutes we had almost white heat it was about 658 to 702 only 2 top burners working then — at no time was the Exit flame more than $\frac{1}{4}$ inch & generally none —

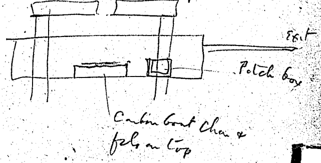
Carbons not noticeably

Altered no hairs guess no deposit. —

Exp'nt 25 = 15 Oct 91

Started 4.9 pm

By passing products decomp Pitch over carbon large amt lampblack etc passes over while if you put Tar towards Exit & Carbon back beyond tar no lampblack goes back only compounds hence I think better results as in Exp'nt 21 = I now use the round iron box filled with pitch

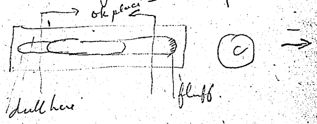

Exit
Pitch box
Carbon Boat Char & felt on top

Now in flame smoke comes off first if held right in flame it burns pbly shows no gas only solid particles heat of big tube not being sufficient to ultimate decomposition smoke is mixture of white + yellow - 415 self sustaining flame - 2½ long very smoky central dust all yellow flames 3 @ 6 inches very irregular - punched it twice shows considerable pressure - 418 Tar comes -

4 inch flame very smoky 419 rather steady now primarily pulsating tube dull yellow - 422 flame 3½ very smoky - no tar - dusty Cinder 90 pct yellow 10 pct white dust, 425 flame 2" long Very smoky 60 pct white 40 pct yellow

tube dull yellow — 428 flame 1 $\frac{1}{4}$.
very smoky 431 flame inch long
scarcely any smoke but Luminous
90 pct white. I find though
the flame dont show much [illegible]
or smoke by holding tip in al
flame there plenty smoke —
~~Glo~~ flame $\frac{1}{4}$ inch stopped 4 39.
a Run of 30 minutes.

Carbons good shiny

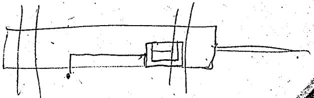


We now rearrange them &
put them back in Carbon Box
reload pitch Cup —

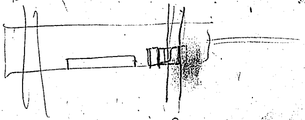
Expmt 26 — Oct 15/91

Experiment 25 duplicated
same Carbons put back + pitch
Cup reloaded —
Started 503 pm — 509 —
4 inch flame very smoky
Central dust, 95 pct yellow dust,
This went little quicker on
account furnace being hot,
511 5 inch large very smoky
flame Lampblk flying all
over me — 516 flame $2\frac{1}{4}$
very smoky 50 pct white
smoke — 520 2" flame smoky
I find that owing to fact
I forgot about thickness
of tar box the mould

have following position in tube



Should be:



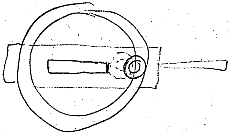
525 - $1\frac{3}{4}$ long flame very smoky 530 flame $\frac{1}{4}$ inch little smoky when tip held in Alcohol flame —

Shut off 533

owing to too rapid coking of pitch backdraught too strong smoked Carbons

Expmt 27 - Oct 15/91

I again duplicate 25 but start furnace only about 100 fahr - and thus instead of as before as shew by dotted lines with hot furnace



Started 740 pm at 745 smoke coming not self lighting but ignites in flame - flam 5 @ 6 long & self igniting blows bad 7 inches long great Lampblack at 748 = 749 Tar -

Tube light yellow – Top off –
750 – Tar – flame 3 @ 4 long very smoky 753 still Tarry – flame
3 @ $3\frac{1}{2}$ long smoky
Tar bothered hole had knock piece off – hole larger flame. sluggish not now the back pressure as before flame goes up 1 3/4 long smoky –

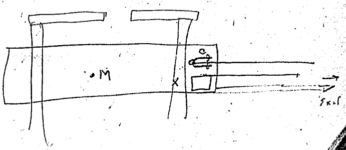
802 – flame $1\frac{1}{2}$ smoky tip

805 same " "

809 – about $1\frac{1}{4}$ flame smoky
Shut off —

Expmt 28

Started 1013 —



Idea is to make Chrysogen by
moving tar box towards X then
twirl fils at C to coat, then
withdraw tar box & thrust fils
~~[illegible]~~ to M which is to be full yellow
heat in tube — then go back & do
same thing over again —
Stopped 1045 Carbon fil rod
got sticking Shut off — $\frac{1}{4}$ inch
flame Composed of smoke Came
out continuously after

The first 6 minuts or so
Tube full yellow -
not shiny But Even heavy
deposit all over, not stick
deposit too rapid

134 Keno

30 hours
all busted

Expmt 29 — duplicate of 28 but with better waking rods

Stained 1250

good

Keno 135 =

grey - but showing under Micro on black background —

16 oct/91

Expmt 30

Started 941

Stopped 1016 -

Carbons on dark background shiny

Even- Keno 136

Expmt 31 -

Napthaline = one cube

Started at 1128. —

Stop 1155 — good - better than Expmt 30 more even & more shiny

Napthaline too sensitive but with longer tube so it could be kept to give non lum flame think it would be good its better than pitch,

Keno 137 —

Expmt 32

~~Started~~ 12 55 —

Hardest paraffine —

Carbons not much deposit of any
Lampblack — 138 Kend

Expmt 33 —

Tetrachloronapthalene

Started 233 am ——

Stopped 257 —

Carbons I think shiny showed ~~that~~ way on air background & are pbly nice didnt notice the frosted silver color as in other = There was a pile of smoke Came out Everytime pulled out Carbon rod out. The whole inside tube Covered with ~~yel~~ whitish deposit yet Carbons OK showed no frosted

139 Reno —

Expmt 34

Started 329 am —

Beta-Napthol =
stopped 4 am = not shiny
when held up look dark
Lamp blacky but both by
Side + End lights ~~brighter~~
silvery = heavy frosted
appearance B Naphthol too
sensitive or did it too
quick - Keno 140

Expmt 35

Meta-Chloral —

Started 4.52 am —

Stopped 5.16 —

No 1 dipd sevl times in
CT Pitch. matter Sol Benzol

No 2 Residue (black) from
BS dislvd Benzol dipd
sevl times.

No 3 Dipd sevl times Benzol
CTP without heating to
prevent oxdation.

No 4 dipped Chloro
CTP sevl times dried
each time —

Nickel Mould 20 mesh char
pm
235 till 1230 pm -

No 9 - Large bunch of previously
prelim Bamboo from Mould
Force in charcoal

No 10 not prelim Raw bamboo
about 100 in bunch - charcoal
tied with Thread. -

No. 11 005 - 2 cbt 1 Cam..
dipi in chloro worked spatula
glass plate = Stuck together
but got a few - Was in Small
box no charcoal

No 12 Same in Charcoal
Stuck but got 2 or 3 -
were longer showing very light

weights prevents drawing
up - showed be no weight

No 13 Large size 008 I think
worked little dif with sparks
& filaments plugged. Makes
which I believe 11 & 12
were not =

Browns Solution No 1 —
Coal tar pitch dissolved
in Chloroform + Lampblk
taken out by filtering
Brown 1 & 2 are from
this No 2 Reg length
showed rise to 128%
cp & only fell to 93 at
320 hours

57

Brown Palladium No 2
part of Coal Tar pitch
Sol in Benzol —

Brown Pal No 3
old Cont. Little Cam
+ plenty Chloro

No 1 - 2000 hours broke
1800 " "
2 2300 "
3 2100 "
4 1700 burning going 5-1k
7 1700 " "
8 5 out of 6 bkn 360 hrs
9 7 out of 6 bkn 360 "
~~9~~ 8 set up 360 c php
No 11 - 003 -
No 1 Lamp 223 1/2 volts.
of 2nd Lot No 1 lamp 228 volts
228
2 " 228
3 " 229
4 228
6 246 —

Set up Tuesday pm 10.50
going 4th =

New numbering system

No 300 is Reg bamboo run to yellow in Ni moved Lab - & gave 124 volts & about 300 hours those taken to Marion & dipped twice in old Reg 17 1st with Camphor only & full yellow 2nd Coal Tar P & same Camphor & redipped & run to full yellow — now gives 108 volts 262 hp — they are flashed somewhat by Coal tar or Cain

No ~~304~~ 301. bunched fibres (100) 12 hours run to yellow (low) 1st attempt in big furnace Oxidized to blue & yellow -

No 302 = Same in another bunch (same run) but not apparently Oxidized

303 N°19 aylsworth – undip
Cbns 15 hours submitted 2 hours
final altogether 1 hour of
which white heat. heat was
dazzling feeble vitrified.
none treated, previous life
before this 235 hours at test;

304 2 dips cooled in
in Box gas – final 3 hours
white hot in old furnace
aylsworth ⓐ 21 (a) —

~~305 aylsworth N°20~~
~~2 dips without final~~
tried this before

305 is Brown 21 gasoline

306 is Brown No 2.2 Coal T

307 is Brown 23 Camphine

Stuff in test tubes

No 1 1 grm ~~Ca~~ Bicarbt. 1 small bottle Dipi then chloro

No 2 2 grms others same as No 1.

No 3 3 " " "

No 4 4 " " "

No 5 Sign in chloro with little Dipi

No 6 - 8 grms BiCbnt small bot dipi chloro

308. 4 times dipped & pumped in Dupi Coubat in Chloro No 4
4 gram

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309 – 4 times in 8, gram sol
as above –

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310 – dipped thick sol
Syrian in Chloro with little
dippi – [illegible]
Kero containing little ChlSol
remained in about hour then
out & in Baizens all night –

311 – Same as 310 but allowed to dry
for 1/2 hour & then soaked in
Kero with ChlSol all night.
out then in Baizen's for ——

Bases May 5/93

Carbolic CP in NH_3
Electrolyzed then pp by
acid very black
stuff Considerable
quantity - fairly
sol in Isob and
Picalin - infusible
Smell aniline on Carb
these are residue pbly
from the Impurit
in Water NH_3 etc
good

Another probable Base

Oil Sassafras in strong H_2SO_4 little at time until no bubbles — then pour in large quantity water by pp — then filter + wash with water, then when water filtered off add. mal dissolves most of it remove the real sal in strong HCl with little H_2O pp it then filter + dry — test if water cant be got out by a volatile solvent without dissolving it = Dont melt /

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above without getting out. water can prob be expelled & probly work OK =

Dinitrobenzoic is reduced by Electrolysis black + is ok I think if all undecomposed Dinitro is dissolved out

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Nordhausen on absol alc – black stuff – ~~Carb~~ always thought to be Carbon but found that it is Theomelanic acid – quite large product, partially sol in ~~Hot~~ aq NH_3 not very much – If could get solvent would be good base

gallic acid with NH_3 & Electrolysis
no pp but solution dries to
glistening black sub - puffs
very little - large product; but
there is an enormous ash
was this in gallic or NH_3
pbly good base if ash out

Oil Thyme - Thio 3d -
part sol Mal is pp by
acid - black oily
swells little, good -
get stuff out that swells
it then its Elegant
very black - dense - shiny
large quantity obtained

(77)

Good base - no trouble

Act on Sugar with strong H_2SO_4 - by adding just little water to make the Carbonaceous residue - Wash it well by grinding fine while wet in Mortar, then filter washing with water, be sure + get it fine - then oxidize to yellowish red by strong HCl + KClO - if not red enough wash with water thoroughly + then alcohol + dry repowder + treat with fuming nitric, throw in water | wash + then Mal Sol in Dippi after heated Iso Ba not perfectly sol -

Dont think this loses much weight is cheap + good - if NH_3ClO could be used be better -

x or if fuming alone would [illegible] no [illegible] will answer

(79)

Purified Gum —

Carb gu from H_2SO_4 Bal
Copabia - added in 6g HCl +
KClO - very light greenish
stuff Carbg with the no signs
[illegible] turns
reddish yellow like Rosin
in - Dipi - [illegible] + Even that
seems just as good - its super
+ Cheap! - Make a lot.
Leaves no [illegible] ash!
Carbonaceous residue when dry same

does this fairly well

Good

Gum arabic SO_4 Carbon Oxdzd
by fuming 24 hours acts same
as above with solvents +
has absolutely no puff - its not
so sol in Dipi but otherwise Ind good

glycerine Carbon
with HCl & $KClO_3$ —
best solvent & one that scarcely
cracks Isobut,

Mal - Chetty & mal alc Ethyl
Chemalin pyridin all shrink
& crack greatly —

glyc Carbon best so far
dont puff much or any
more than Reg with Is & but
& dried —

Tried this again but
not ¼ sol probably not
acid on nuff. Nitric
Carbon [illegible] & other oxidizers
sol in NH_3 water N.G.

but think glyc— Carbo
properly oxid by $HCl + KCl_3$
might be worked ok—
I'm trying it again—
do it double (1e) first
in strong sol then dilute
& filter & then in a new
sol—

The following is good
base + nomisolake
[illegible] in acetic
acid & common nitric
poured in, turns brownish
its sol, but ppt by pouring
in large quantity water
over

filter this off. what runs
through is red & of pp. by
NH_3 Stuff is ng that is
pp. as it has Nitro Compounds
& melts also but stuff
pp by [illegible] in first
[illegible] & washed well
with HCl [illegible]
get about 1/2 of original
Sol Residue = Semi Sol
Chlo Sol Iso but but
dark dry stuff
pbly Sol in Lots
things –

Camphor Carbon SO_4
Hot - good work this up -

Camphor Carbon
Is at least ok -
part oxdzd by HCl & $KClO_3$
yellow dont puff in slightest
+ sol in Iso + others good
Shiny red in butter dish
Work it up.
product rather small

Balsam Copaiba Carbon appears Sol by itself in Isot Picoline —

Have some on hand dont know if used

Hot SO X

Balsam Cop Carbon Oxid by Nitric dont puff slightly Sol Picoline strongly

OK

There is [illegible] [illegible] [illegible]

Napthalamine in Hot. SO_4
then pieces KClO thrown in
& pp by water Dried
& Drying — dark stuff
Carbon (and) dense & high
Specific grav — Sol [illegible]
& Iso + Iso [illegible] [illegible]
[illegible] —

Base fine must work up

H_2SO_4 + Camphor - hot
but don't Carbonize it (i.e.) go
so long as it becomes
suddenly solid. it may
froth up a great deal
gas come off but stop
at right point - filter
danger point left Extraordinary
black + if you keep on
adding water it goes
through filter its so
finely div - can wash it
moderately as H_2SO_4 in
minute amount won't hurt
product sal 900 fine shiny dry
dust proof dense -

Glycerine Carbon very finely precipitated or dialysed & filtered probably sticky stuff to squirt if so dries to Extraordinary hard dont puff away due to Oxides but perhaps may Crack ..

Cam full Carbon
acted on fuming also
HCl $KClO$ for long time
became blood red &
perf sol - good —
good base
~~bad [illegible]~~

following are good Gases -

Bottle marked No 1 BX

is Conc H_2SO_4 in Evap dish & Camphor got it hot lots gas come off & I smelt SO_2 but I carried it only so far as liquid got black but not to point to make Carbon where it suddenly solidifies - then put in Water & filtered a its Extraordinarily finely Divided & must have liquid that comes through put back several times, then its filter paper put out Dry, when rather dry (i.e) Edges Dry & Center still moist when washed pour ~~it~~ Matter & get it into a

(101)

beaker. then pour into a flat Enamelled dish & Evaporate, it dries to extraording shiny glistening black & cracks & contracts to pieces — not the slightest puff on Carbzg Even the Edges are razor like on Carbzn & gives off no smoke it shines Even when red hot but it cracks tremendously a filament 1000 dia would crack bad hence it probably wants something with it or a viscous Solvent that will partially remain at high temps to prevent it cracking

The product Isolated

Say is half the Camphor-

Try Solvents

2nd Base — Battle CX

Same as above but heat carried so far as to suddenly solidify making Carbon — this is very strongly worked with 3 doses [illegible] of HCl + KCl_3 until it very red — then air dried for 3 days on paper it dont stick to paper. afterwards its taken from paper & ground in mortar then put on agate flat dish & sun dried all day - not the slightest puff & apparently no gas or smoke comes off

It is very hard to wash it as its somewhat sticky in filter & works slow - perhaps best before filling to boil -

Try Solvents

Yield very large - 1/2 of Carb at least

2 Bx - 600 cc cp Kalbfleish
H_2SO_4 - 120 grms Cam - brought
up slowly. got black added
Little water but found very
Little sediment so put
it on again & ran it till
there was not very much
froth But didn't let it
get solid. then turned
off light & added
Considerable water slowly
then it stood all night
& filtered it with only
about 3 times its bulk
of water - it didn't
Eat paper - Quite large

residue - after 1st filter
added but little water to
wash out acid - then
put the thick black stuff
in dishes in drying
oven dried several
hours stirred it +
finally powdered it
then dried it nearly dry
cooled just till it was
damp — got back
about 70 grams
of the 120 — if dis in
ab Ethyl ppt ~~bg~~ in
Benzol ok or in Reg
ural ppt by Chloro
-ok

also in Mal & pp in strong
HCl - ~~dis~~ it pp; but
haven't tested resultant
stuff =

The H_2SO_4 Cam hot that
got soaked. then very
little washed & in
lump just as it pp'd
put in KCl & HCl -
24 hours - then filtered
& not washed well ~~th~~
then Dried in Drying oven
212 seems to be just as
good as BX 1 BX.2
but more yellow - same solution
& Carbz same Will Call

ct. BX-3-

BX 4 is the big Lot

600 cc SO4 - 150 Cam - Solid

then washed 24 hours

then in KClo + HCl -

dilute - then strong

then filtered took

5 days + part is still

unwashed on

Egg Albm H_2SO_4 —
afterwards $KClO_3$ HCl —
dis NH_4 + Evap —

following have action as
solvents alone & in
Combination Iso-
Methyl Jodat
Foramid
Aseptol
Methyl formic
pyridin Hydrochlorat
phenylhydrazin
Tetramethyl ammon hydrate
a Liquid Resorcin Cant
See first part Label

Isopropylalcohol

Valeraldeheyde

Riga Balsam in Carnation Iso

Formic Ether

N° 12

263

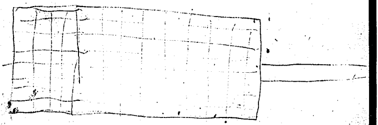
Monochlorhydrin —

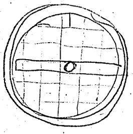
Glycerin with Iso —

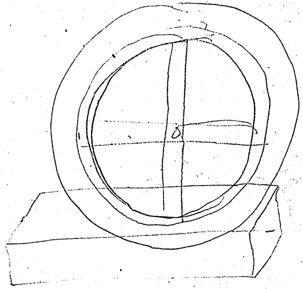
H_2O —

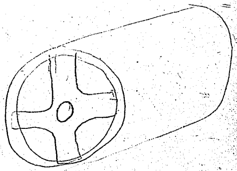
NH_4

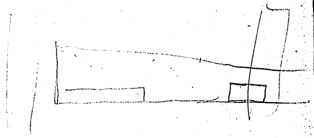
+ Iso

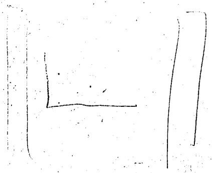


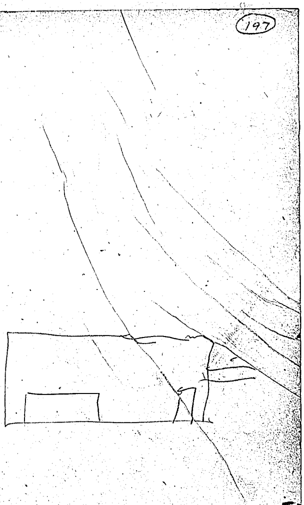




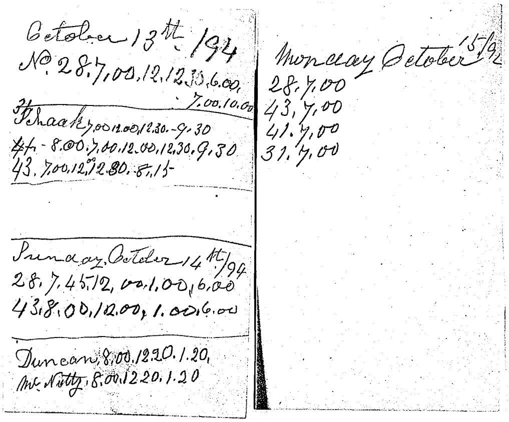








[ITEM FOUND IN BOOK]



October 13th /94
No. 28. 7.00, 12, 12.30, 6.00,
7.00. 10.00

31 Schaak 7.00 12.00, 12.30. - 9.30
~~41~~ - 8.00, 7.00, 12.00, 12.30, 9.30
43. 7.00, 12.00, 12.30. 8.15

Sunday, October 14th/94
28. 7.45, 12, 00, 1.00, 6.00
43. 8.00, 12.00, 1.00, 6.00

Duncan, 8.00. 12.20. 1.20,
McNitty, 8.00. 12.20. 1.20

Monday October 15/9
28. 7.00
43. 7.00
41. 7.00
31. 7.00